

FIGURE 1 – Prior Art

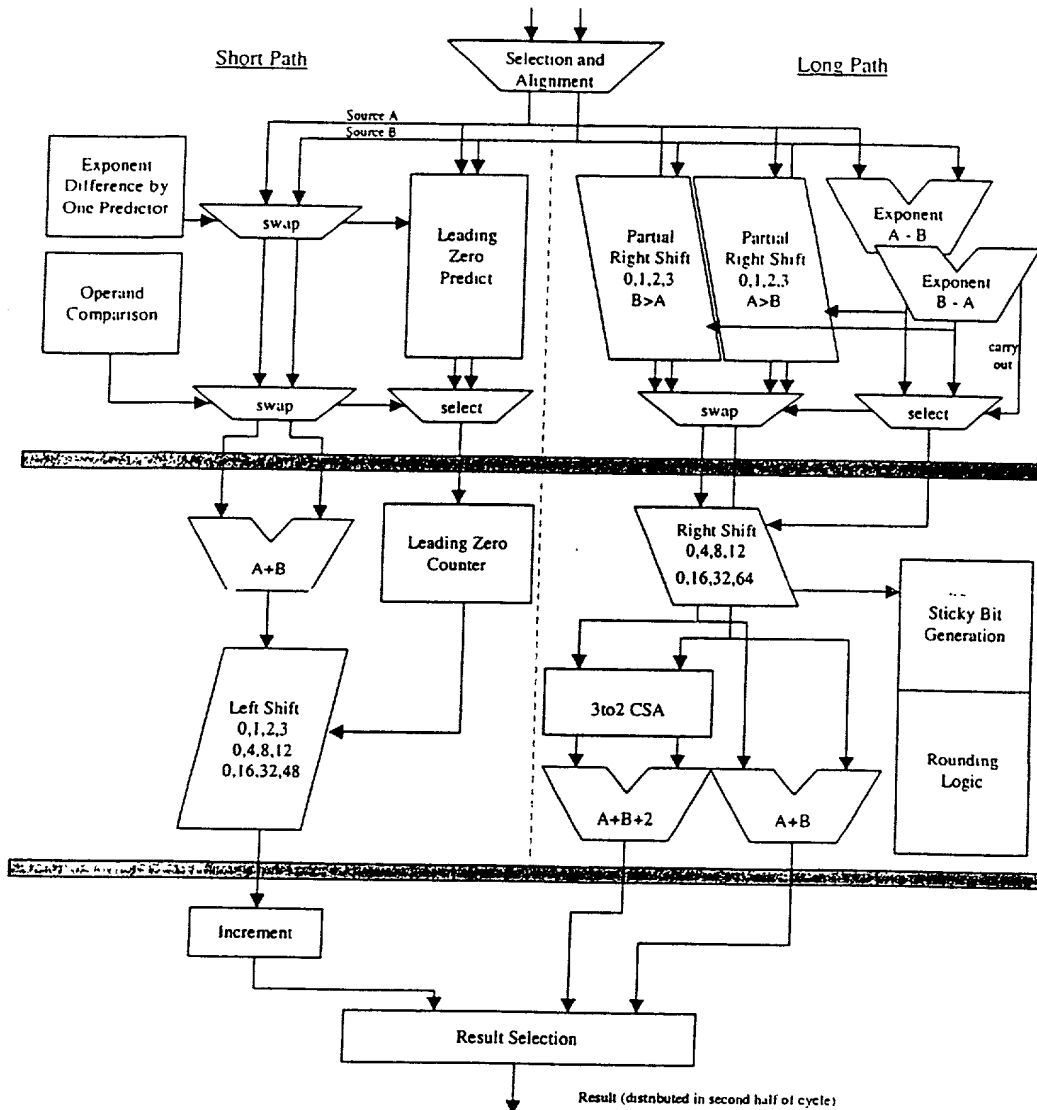


FIGURE 2

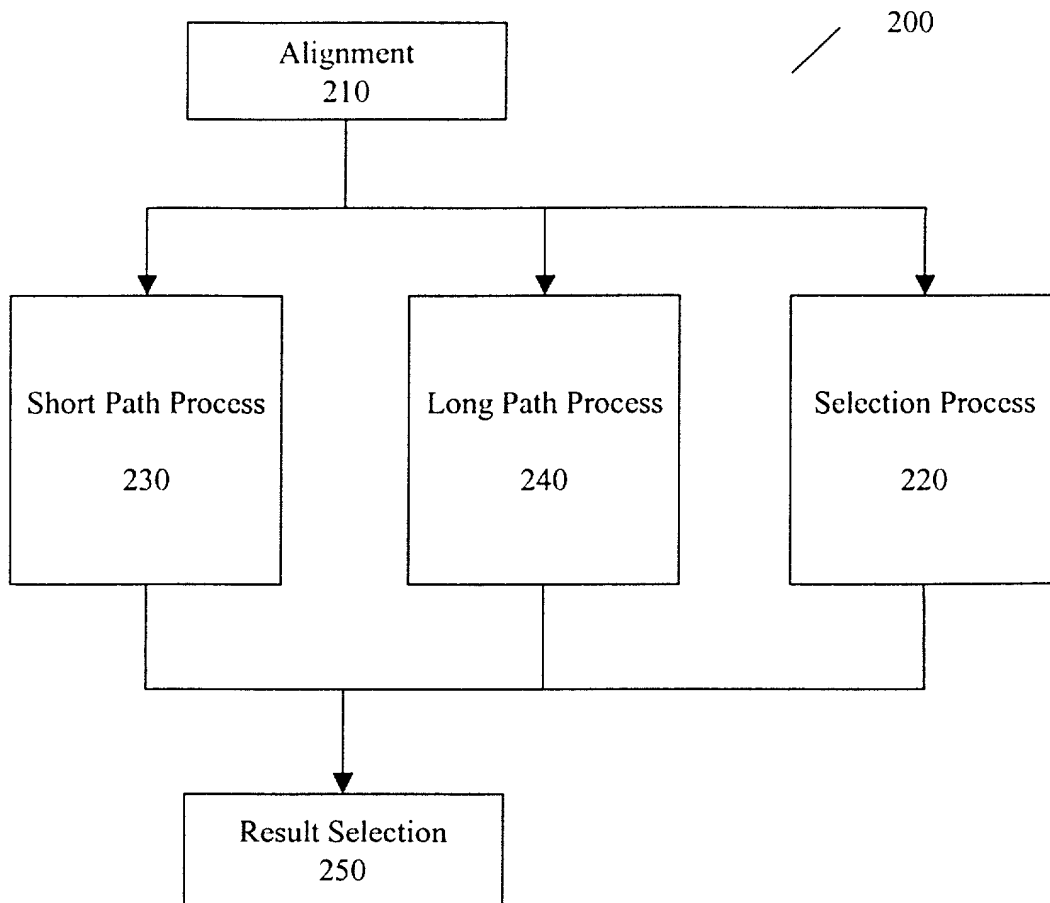


FIGURE 3

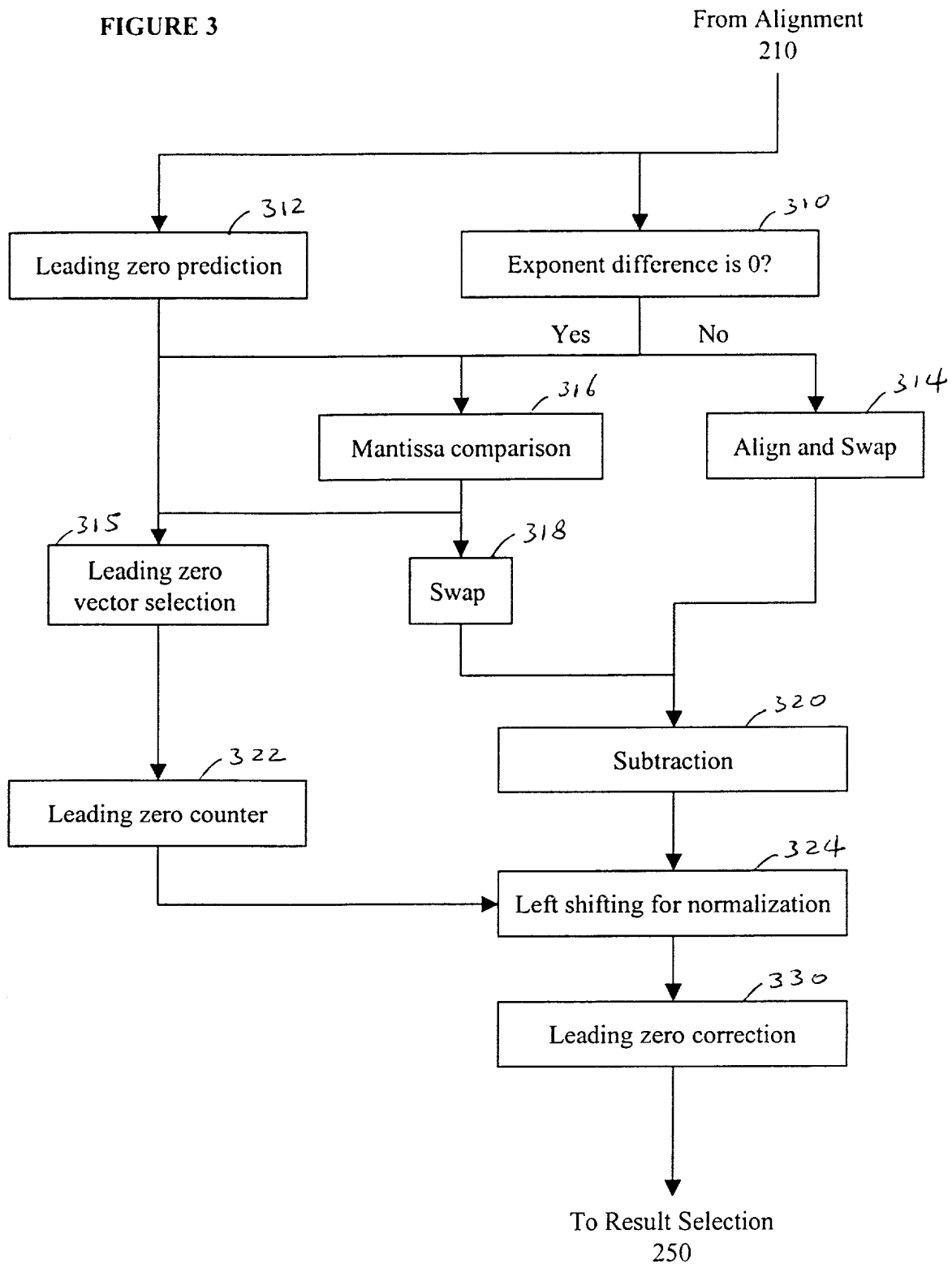
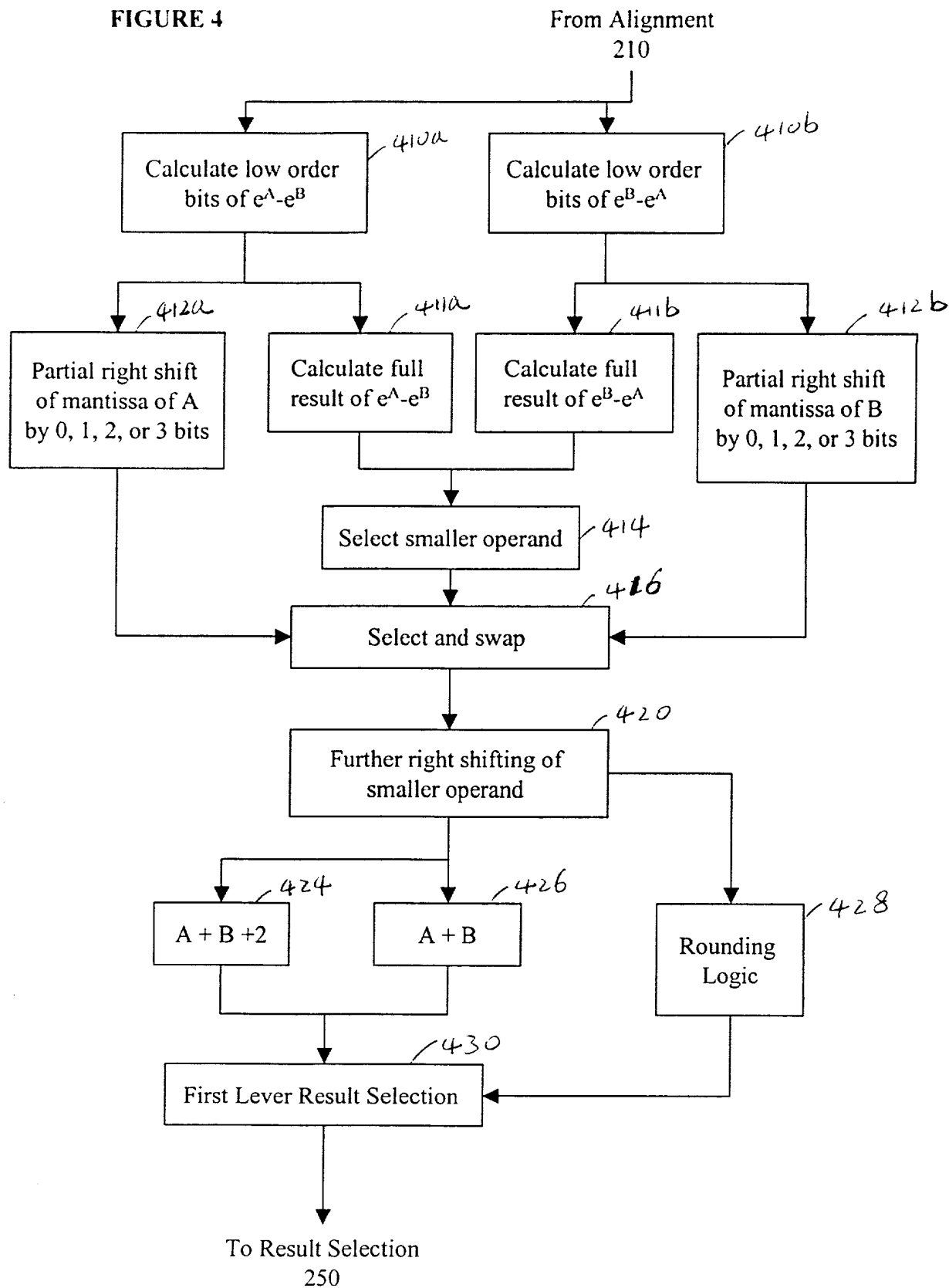


FIGURE 4



The diagram illustrates a floating point adder architecture, divided into a **Short Path** and a **Long Path** by a vertical dashed line.

Short Path:

- Inputs **A** and **B** from the **Selection and Alignment** block (510) are processed.
- Leading Zero Predict** (512) and **Leading Zero Counter** (522) are used to determine the number of leading zeros.
- Left Shift** (524) shifts the operand by 0, 1, 2, 3, 0, 4, 8, 12, or 0, 16, 32, 48 bits.
- LZ Correction** (530) is applied to the shifted operand.
- The **Result Selection** (550) block receives the output of the Short Path.

Long Path:

- Inputs **A** and **B** are processed.
- Partial Right Shift** (513a, 513b) shifts the operand by 0, 1, 2, 3 bits for $B > A$ and $A > B$.
- Exponent** (511a, 511b) calculates $A - B$ and $B - A$.
- Right Shift** (521) shifts the operand by 0, 4, 8, 12, 0, 16, 32, 64 bits.
- 3to2 CSA** (523) is used for carry propagation.
- A + B + 2** (525) and **A + B** (526) are calculated.
- First Level Result Selection** (531) selects the appropriate result.
- Rounding Logic** (528) is used for rounding.
- The **Selection Logic Module** (530) receives the output of the Long Path.

The **Result Selection** (550) block receives inputs from the **Short Path**, **First Level Result Selection** (531), and the **Selection Logic Module** (530) to produce the final **Result**.

FIGURE 6A – Addition Result Selection in the long path

Overflow Bit	Roundup Bit	LSB	Result	
			(Double Precision)	(Single Precision)
1	1	-	$A+B+2[64:12]$	$A+B+2[64:41]$
1	0	-	$A+B[64:12]$	$A+B[64:11]$
0	1	1	$A+B+2[63:12],0$	$A+B+2[63:41],0$
0	1	0	$A+B[63:12], 1$	$A+B[63:41], 1$
0	0	-	$A+B[63:11]$	$A+B[63:40]$

FIGURE 6B – Subtraction Result Selection in the long path

Roundup bit	MSB	LSB	Guard	Double Precision result
0	0	-	-	$A+B[62:10]$
1	0	0	0	$A+B[62:12],01$
1	0	0	1	$A+B[62:12],10$
1	0	1	0	$A+B[62:12],11$
1	0	1	1	$A+B+2[62:12],00$
0	1	-	-	$A+B[63:11]$
1	1	0	0	$A+B[63:12],0$
1	1	0	1	$A+B[63:12],1$
1	1	1	0	$A+B[63:12],1$
1	1	1	1	$A+B+2[63:12],0$